

PATENT ABSTRACTS OF JAPAN

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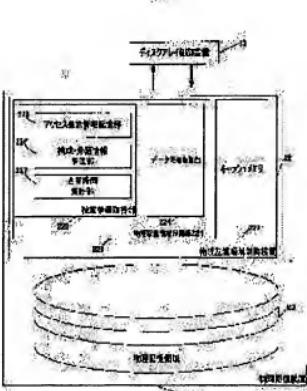
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(54) STORAGE SUB-SYSTEM, AND MEMORY USED THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an occupied time of a logic storage area in a physical memory, and to obtain precise access occupied time information in every I/O to the physical memory.

SOLUTION: A physical storage area controller 22 on the individual physical memory 15 is provided with a table 225 for storing information about access requirement from a host computer, a table 227 for totaling the occupied time as to access, a table 226 for control information for classifying constitution of a disk array, and a data processing control part 224 for obtaining constitution information and classification information of the logic storage area from a disk array controller 13, and for requesting the constitution information and the classification information of the logic storage area to the disk array controller, when necessary. The disk array controller 13 is provided with a means for transmitting the constitution information of the disk array at the present time to the physical storage area controller in response to the request from the physical storage area controller on the physical memory.



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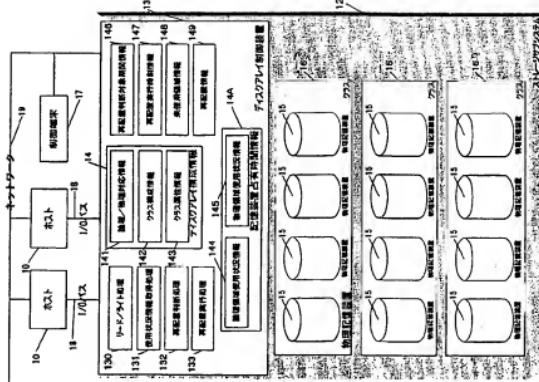
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2.2.6 情報・分類情報管理部
2.2.7 占有時間集計部

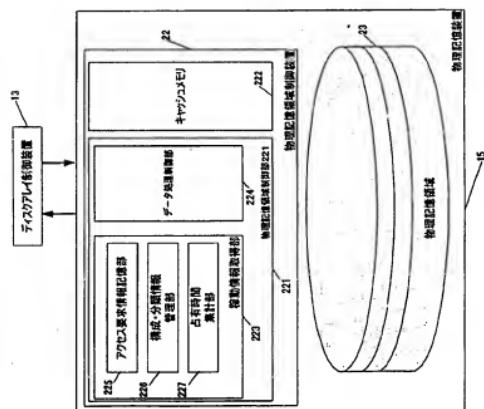
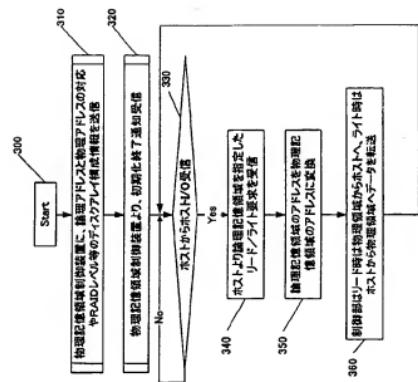
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112



[8]

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【図2】
図2【図3】
図3

【図9】

図9

機器記録 機器番号	機器アドレス	機器記録装置番号	機器記録装置アドレス
1	3000～3999	1	4～99
4	4000～4999	1	100～199
5	5000～5999	1	2000～2999

図4

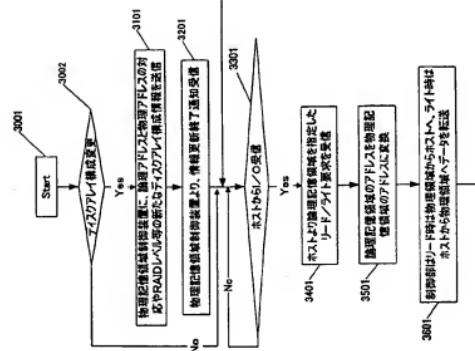


図5

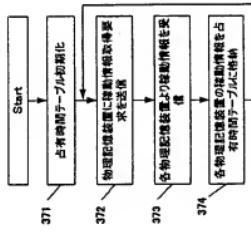


図6

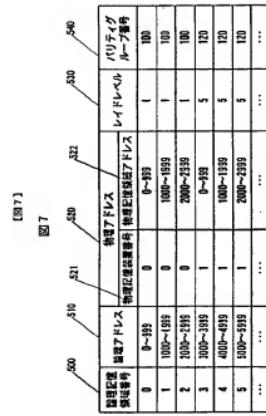
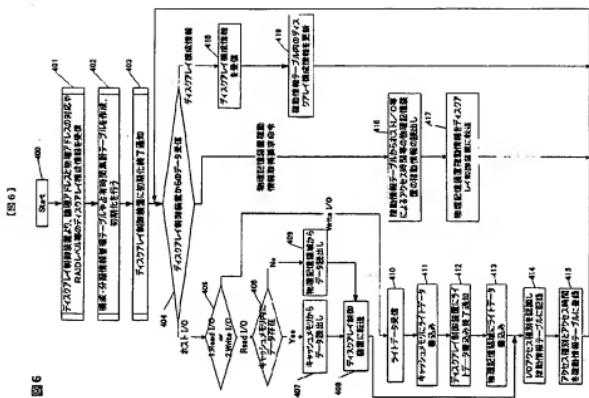


図7



101

プロジェクトベースの競争

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. ~~www~~ shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] A means to be connected to 1 or two or more computers, and to acquire the operating condition information on two or more physical memory equipments and two or more of these physical memory equipments. In the storage subsystem which has a means to perform matching with the logic storage region which said computer makes a read/write object, and the physical memory field of said physical memory equipment. A means to acquire the operating condition information of said physical memory equipments. A means to perform matching with the logic storage region which said computer makes a read/write object, and the physical memory field of said physical memory equipments, and a means to perform matching with the logic storage region which said computer makes a read/write object, and the physical memory field of said physical memory equipments. A means to be provided in the control unit which controls one or more above-mentioned physical memory equipments. Said control unit Furthermore, it has a means to transmit the information which performed matching with the logic storage region to the physical memory equipment, and the physical memory field of physical memory equipment to said two or more physical memory equipments of each. It is the storage subsystem which each of one or more of said physical memory equipments is equipped with a physical memory field of unit, and is characterized by that physical memory field control unit having a means to acquire the operating condition of a physical memory field.

[Claim 3] It is physical memory equipment which is equipped with a physical memory field control unit in the physical memory equipment which constitutes a storage subsystem, and is used for storage subsystem according to claim 1 or 2 characterized by this physical memory field control unit, having a means to acquire the operating condition of a physical memory field. [Claim 4] Said physical memory field control unit is physical memory equipment according to claim 3 characterized by having further a means to store the operating condition information on the acquired physical memory field.

[Claim 5] Said physical memory equipment according to claim 4 characterized by to have further a means store the information which matched the logic storage region and the physical memory field of the physical memory equipment which receives the operating condition information on the physical memory field of self-physical memory equipment from a means to transmit to said control unit, and said control unit, according to the acquisition demand of the operating condition information on a physical-memory field which receives from said control unit.

[Translation done.]

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relocation, since the I/O access occupancy hour entry to a logic storage region serves as data which become origin, it is important.

[Problem(s) to be Solved by the Invention] Although, as for the conventional technique indicated by the official report mentioned above, it is said that a disk array control unit acquires the occupancy time report by I/O to a logic storage region, the approach shown in this

[0009] First, the case where the writing (light) of data is performed to a certain logic storage

corresponding to the logic storage region concerned. A physical memory field is in physical

physical memory field which mainly carry out the cache of a physical memory field control section and the data. And when carrying out the light of the data to a physical memory field, it

writes in, when a physical memory field control section writes light data in a cache, and the response of termination is notified to a disk array control unit. For this reason, in order that the conventional technique mentioned above may actually carry out the light of the data, it will have the trouble that the time amount which accessed the physical memory field is not known.

Cache memory is accessed and data is returned. For this reason, it will have the trouble of reading the data from the memory, thereby causing a certain delay. A storage region is considered. In this case, a fault although the lead of the data in the physical memory field corresponding to the logic storage region concerned is performed, when that lead data is in the cache memory in physical memory equipment, a physical memory field is not accessed, but cache memory is accessed and that data is returned. For this reason, it will have the trouble of reading the data from the memory, thereby causing a certain delay.

that the exact time amount which could not distinguish and accessed the physical memory field in the physical memory field for the data lead. [0011] Moreover, the case where the logic storage region currently crossed to A, B, C, D, and

Response A is made to a stimulus when the stimulus is made to a response. A is made to a time of day of Access A into A' (t) etc. for the time of day of A (t) and Access B. Here, Access A accesses physical memory equipment with a data lead, leads data, and assumes Access B to be what had the response B without accessing physical memory equipment, since data are in a cache with a data lead.

In this case, the direction of response B of Access B which came after response A of the access A which was suited previously. That is, it becomes $A(t), B(t), A'(t)$ $B'(t)$. At this time, the conventional technique which acquires the occupancy time amount by I/O to a logic storage region in a disk array control unit produces the trouble that sweet red

physical memory equipment how much, or it hit into the cache of physical memory equipment. [0012] The purpose of this invention is by solving the trouble of the conventional technique mentioned above and acquiring the occupancy time amount of a logic storage region with physical memory equipment to offer the store which offers the storage subsystem which enabled

It is to acquire the occupancy time amount (real operating time) of each logic storage region by the system configuration unacquirable [with a disk array control unit], and is used for this.

utilization factor prediction and to perform optimum performance tuning more it is in offering the store which offers the storage subsystem which can acquire the access occupancy hour entry for every I/O to physical memory equipment with a more high precision, and is used for this.

means for solving the problem. According to this invention, said purpose is connected to 1 or 2 or more computers. Two or more physical memory equipments, in the storage subsystem which has a means to acquire the operating condition information on two or more of these physical memory equipments, and a means to perform matching with the logic storage region.

http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web.cgi_ejje

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2005/10/06 http://www4.ipd.nict.go.jp/ceri-bin/1tran/web/cei/eise

Memory equipment. A means to acquire the operating condition information on said two or more physical memory equipments, and a means to perform matches with the logic storage region which said computer makes a read/write object, and the physical memory field of said storage region. **Memory equipment.** It is prepared in the control unit which controls two or more above-mentioned physical memory equipments. Said control unit Furthermore, it is matched with the logic storage region of physical memory equipment, and the physical memory field of physical memory equipment, to said two or more physical memory equipments of each. It has a physical memory field control unit, and this physical memory field control unit is attained by having a means of two or more of said physical memory equipments to acquire the operating condition of physical memory field, respectively. Moreover, said purpose is set to have a physical memory equipment which constitutes a storage subsystem. A means by which have a physical memory field control unit and this physical memory field control unit acquires the operating condition of a physical memory field. An operation demand of the operating condition information on a means to store the operating condition information on the physical memory field, and the physical memory field information on the physical memory field, and the physical memory field information on the physical memory field. It is accepted by having a means to transmit the operating condition information on the physical memory field of self-physical memory equipment from said control unit, and a means to store the information which matched the logic storage region of physical memory field of the physical memory equipment received from said control unit.

Figure 22.2 (a) A physical memory (b) a memory control section and (c) a cache memory control section. (d) Configuration, classification Research and Data Processing Department and (e) the Cache memory total sections.

information 141 corresponding to a logic storage region / physical memory field, the class configuration information 142, the disk array configuration information 143 of class attribute information 143 grade, storage source entry 144 of the logic field operating condition information 144 and physical field operating condition information 145 grade, the relocation duration horizon information 146, the relocation activation time information 147, the free-space information 148, and relocation information 149 grade. In addition, others and party group information, RAID level information, etc. which were mentioned above may be included in the disk array configuration information 14 mentioned above. [Information 14]

[0020] Moreover, the host 10, the disk array control unit 11, and the control terminal 17 are mutually connected by the network 16, respectively. The disk array control unit 11 may be constituted by Ethernet (trademark), FDDI, the fiber channel, etc. A control terminal 17 is usually used in order to perform maintenance, management, etc. of the storage subsystem 12.

[0021] Moreover, in explanation of the operation of the gestalt of this invention, although it exists, respectively, since it is not important, the component which rarely exists in computers, such as memory for performing processing which appears in a host 10, the disk array control unit 13, and a control terminal 17, respectively, and CPU, is not specified here.

[0022] The class division of two or more physical memory equipments 15 formed in the above-mentioned storage subsystem 12 is carried out for every eigen performance of every class. Moreover, although not shown equipment, and they constitute the disk array 16 for every class. Moreover, although not shown

clearly, two or more physical memory equipments are used, and the party group is constituted here. And each of physical memory equipment 15 is constituted by the physical memory field control device 22 which controls the physical memory field 23 and this physical memory field 23 is shown in drawing 2, and various data are stored in the physical memory field 23. [0023] Moreover, if the address of the physical memory field 23 seems to have mentioned above from a heat 10, it does not break, but a heat 10 accesses the data on two or more logical storage regions on two or more physical memory fields 23. Namely, a hot 10 accesses by specifying the storage region 11 in the storage region of each physical memory equipment 15 in the storage subsystem 12. The detail of the storage region 11 will be described later.

Ques 2) The base array control unit 15 is connected with two or more physical memory units 13, and it processes instruction I/O which are issued by two or more physical memory equipment units 13, or were emitted by said host 10. Make the address of the logic storage region where the aspernited data exist, and the address of a physical memory field with the address of the logic storage region correspond, transmit data I/O to suitable physical memory equipment 15, and if it is light processing, the data transmitted by the host 10 are transmitted to physical memory equipment 15, and if it is lead processing, the data transmitted from physical memory equipment 15 are received, and it's processing transmitting to a host 10 etc.

[0025] The physical memory field control unit 22 which has in physical memory equipment 21 is constituted by the physical memory field control section 221 and cache memory 222. Cache memory 222 has the quick rate of processing of the read/write of data compared with the physical memory field 23. And cache memory 222 is used as follows about the data about the lead or light instruction transmitted from the disk array control device 13. That is, in case the light data transmitted from the disk array control device 13 are written in the physical memory field 23 in light processing, data are written also in cache memory 222. Moreover, in case data reading appearance is carried out from the physical memory field 23 in lead processing, when it was written in cache memory 222, or the same data are in cache memory and it comes to physical memory equipment 21 from the disk array control device 13 as a lead instruction to data by former lead processing, the read data do not read the data from the physical memory field 23, but read it from cache memory 222. thereby, the processing engine performance of physical memory equipment 15 can be improved.

[0026] The physical memory field control section 221 is mainly equipped with the operation information section 223 and the data processing control section 224, and is constituted. The data processing control section 224 receives the lead or light instruction of data transmitted from the disk array control device 13. And the data processing control section 223, based on the lead or light instruction, performs the processing of the data.

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<http://www4.indi.ncipi.go.jp/cgi-bin/tran/web/cen/eie>

when accessing cache memory 22 for every (random access, sequential access, etc.) memory access classification of an I/O process, and to record on the occupancy amount total time of cache memory 22. It classifies into a physical memory field to what whether time amount access was read out and a physical memory equipment 15 of cache memory 22 it hit, according to an I/O access, and it becomes possible to total the occupancy time amount.

[0031] Drawing 3 is a flow chart explaining processing of a disk array control device when a storage system is started and explains this hereinafter.

[0032] (1) The disk array control unit 13 transmits the information 141 corresponding to the physical memory which is the matching information on the address of the logic storage region in the physical memory equipment 15, and the address of the physical memory field where the logic storage region actually exists, the class configuration information and the disk array configuration information 14 of class attribute information 13 grade to the physical memory equipment 15 connected with unit 13 at the time of starting of the physical storage subsystem 12 (steps 300 and 310).

[0033] (2) Next, for the physical memory field control unit 22 changed [the notice 1] to the physical memory equipment 15 sent from the physical memory equipment 15 becomes accessible by transmission of the information mentioned above. Through one and physical memory equipment 15 is in the condition of the initialisation termination by the disk array configuration information 14 (step 320).

[0032] (3) Then, the disk array control device 13 receives data with more various what has transmitted host I/O of a lead or light processing to the storage subsystem 12 to the logic storage region in the storage subsystem 12, things which deliver an instruction and data with disk array control devices than a honest 10 h I/O-hour 18 courses (etan 3.20)

When host I/O is received as said received data, the disk array control unit 13 receives the lead of light demand to the logic storage region specified by host I/O, and asks for the logic storage region address and the corresponding address of the physical memory field 23.

address) of the logic storage register into the address (physical address) of a physical memory field [field 45] (5). The disk array control device 13 specifies the address of the physical-memory field where predetermined data exist, and in read processing, transmits light data to the physical-memory equipment which transmit read data to read-out and a host 10, receives the light data transmitted by the host 10 in light processing, and has the physical address (360).

[0038] (1) By the change in physical memory equipment 15, change of RAID level, and a logic storage region moving, the system control device 13 to the address of a physical memory, field information field changes, and explains this hereafter.

information 143 grade as transmitted (data 101) to the physical memory equipment 155. Next, the disk array unit 13 receives the physical memory equipment 155 from the physical memory field control unit 22 changed [the notice 1 to the accessible ready state, when physical memory equipment 15 becomes accessible by transmission of the information mentioned above. Then comes and physical memory equipment 141 is in the condition of the updating termination by the data array configuration 14 (step 201).

module which issued the access directions to a certain storage region [0404]. Moreover, the information [41] corresponding to logic/physics in the above-mentioned is information to which a logic storage region and a physical memory field are made to correspond. And the logical address is the address which shows the logic storage region which a host 10 uses in said read/write processing section 1.30. Moreover, a physical address is the address which shows the field on the physical memory equipment 15 with which data are actually stored and consists of a physical memory device number and the address in physical memory

equiment. A storage number shows each physical memory equipment 15. The address in storage is the address which shows the storage region within physical memory equipment 15. [0041] Drawing 5 is a flow chart explaining processing activation of the disk array control device 13 at the time of the disk array control device 13 reading the information in the operation information acquisition section 202 of physical memory equipment 15 and sending the same to the host computer 10.

[0042] (1) After the storage subsystem 12 is started, the disk array control device 13 initializes storage occupancy hour entry 14A, and transmits an acquisition demand of the access information acquisition section 22 of primary memory equipment 14, and explains this request.

equipments 15 connected after that. (steps 371 and 372).

[0043] (2) Next, the disk array control unit 13 stores the access occupancy hour entry 14A for an reception and each physical memory equipment 15 (steps 373 and 374).

[0044] In addition, the timing of acquisition of the access occupancy information on the disk array control unit 13 mentioned above. The method which reads the access occupancy information by access to physical memory equipment 23 from the module of others by host I/O, back up, etc. to a fixed time interval. When an access occupancy hour entry acquisition demand is transmitted to the disk array control unit 13 from other modules (for example, a host 10 and a control terminal 17), it is various and dependent on a design.

[0045] The access occupancy hour entry acquired by the above-mentioned is recorded on the occupancy time amount total section 23 from the disk array control device 13.

(0046) Drawing 8 is a flow chart explaining processing of the physical memory field control device 22 in physical memory equipment 15 next explains this.

[0047] (1) The physical memory field control device 22 receives the disk array configuration information 14 which is information on the logical address and the physical address of the physical memory field 22 of the data 15 transmitted from the disk array control device 13 at the time of starting of the storage subsystem 12, i.e. physical memory equipment, such as correspondence. (steps 400 and 401).

[0048] (2) The physical memory field control unit 22 which received the disk array configuration information 14 performs configuration initialization of configuration / classification information management table of configuration / classification Researcher and Data Processing Department total section 223, or the occupancy time amount total section 227 based on the information (step 402).

[0049] (3) After initialization processing of the table in step 402 is completed in order to make physical memory equipment 15 recognize an accessible thing, notify that initialization processing was completed to the disk array control unit 13. in addition, it is not necessary to transmit the information to which physical disk equipment changed in the accessible condition to the disk array control device 13 when the access directions to a certain storage region come to the physical memory field control unit 22 of physical memory equipment 15 after the fixed time section 227. in this case, the physical memory field control unit 22 it is in a condition accessible to physical memory field 22 in order to perform predetermined processing. Access the physical memory field 22, perform predetermined processing and if impossible [whether processing is performed in the condition of having stored access information in the access request information storage section 225, and becoming accessible to the physical memory field is performed, and/or you may make not receive a certain access directions to a storage region to the physical memory field control unit 23 in the accessible condition, in order to form predetermined processing (step 403).

[0050] (4) The physical memory field control device 22 waits to transmit host I/O, and array configuration information from the disk array control device 13, and receives it (step 404).

[0051] (5) At step 404, if host I/O is received from the disk array control unit 13, when the I/O codes lead processing or light processing and it is lead processing, the data processing control section 224, will confirm whether the data which should be read exist in cache memory 22 (steps 405 and 406).

[0052] (6) When the data is read from cache memory 22 when the data exists in cache memory 22, and the data does not exist in cache memory 22 with the check of step 406, read the data from the physical memory field 23 and transmit data to the disk array control unit 13 (steps 407, 408, and 409).

[0053] (7) At step 405, when judged with host I/O being light processing, the data processing control section 224 receives the light data transmitted by the host 10, and writes the light data in cache memory 22 (steps 410 and 411).

[0054] (8) And the data processing control section 224 stores the above-mentioned light data in the physical memory field 23 and transmits data to the receiving disk array control device 13. The example shown in

the physical memory field 23 while notifying the notice of data write-in termination to the disk array control device 13 (steps 412 and 413).

[0055] The data processing control section 224 to cache memory 22 after processing of step 408, or processing of step 413 (9) In access ** or the JBQ classification information on the information on whether the physical memory field 23 was accessed, a random lead, a sequential lead, etc. The access classification information on the random read/write at the time of writing light data in the physical memory field 23 sequential read/write, etc. is recognized. The occupancy hour entry which accessed cache memory 22 or the physical memory field 23 is stored in the occupancy time amount total section 227 in the operation information acquisition section 223 for every access classification (steps 414 and 415).

[0056] (10) New disk array configuration information is received from the disk array control device 13 at step 404, the data processing control section 224 will receive the information in configuration / classification Researcher and Data Processing Department 226, the operation information acquisition section 223, corresponding to new disk array configuration information (steps 416 and 419).

[0057] (11) When a physical memory equipment operation information acquisition demand instruction is received from the disk array control device 13 at step 404, the data processing control section 224 reads the access occupancy hour entry of the physical memory equipment 15 stored in the occupancy time amount total section 227 in the operation information acquisition section 223 and transmits it to the disk array control device 13 (steps 416 and 417). In addition, it may be made to perform transmission to the disk array control device 13 from the physical memory equipment 15 in the occupancy hour entry in processing step 417 mentioned above to the disk array control device 13 with a fixed time interval automatically from physical memory equipment 15. In this case, said physical memory equipment instruction operation information acquisition demand instruction is not transmitted to physical memory equipment 13 from the disk array control unit 13.

[0058] Drawing 7 is drawing explaining the example of a configuration of the information 141 corresponding to logic/physical in the table for managing correspondence with the address of a logical storage region and the address of a physical memory field which are held in the disk array control unit 13.

[0059] The disk array control unit 13 has managed correspondence with the address of the logic storage region in the physical memory field 22 in two or more physical memory equipments 15 connected, and the address of the physical memory field in the logic storage region. Each of the logic storage region number 500 given to a specific logic storage region, the logical address 510, the physical address 520 by the storage number 521 with a physical storage region with the logic storage region and the address 522 of a physical storage region. The RAID level 530 that shows the engine performance of the physical-memory equipment 15, and the parity group number 540 to which the physical-memory equipment 15 belongs is matched, and the information 141 corresponding to the logic/physical used for this is constituted, as shown in drawing 7. When processing of a lead a light, etc. specifies the address of a logic storage region from a host 10, a control terminal 17 and other modules (for example, other disk array control units etc.) and it is accessed to the self-disk array control unit 13 by having such information 141 corresponding to logic/physical, the disk array control unit 13 can change the address of a logic field into the address of a physical storage region, and can perform read/write processing of data correctly to physical memory equipment 15.

[0060] Drawing 8 is drawing showing the example of the logic field operating condition information 144 stored in the disk array control unit 13, and the storage occupancy information 141 of physical field operating condition information 145 grade. Such information is constituted as an occupancy time amount total table.

[0062] The disk array control device 13 reads periodically the access occupancy information on the physical memory field 23 of the physical memory equipment 15 by access from the module of others by host I/O, back up, etc. from the occupancy time amount total section 227 in each physical memory equipment 15, and records the access occupancy hour entry on the occupancy time amount total table in the receiving disk array control device 13. The example shown in

claim 8 is every logic storage region number 801 and I/O. Occupancy time amount is totaled every JOB classification. 1/0 As a JOB classification, although 670 and a total of 860 are shown by the example of illustration at the time of the sequential lead 10, the sequential lead 620, the sequential light parity 530, the random lead 840, the random light parity 860, and a cache hit, it is 1/0 of further others. There may be JOB classification. [0063] The occupancy time amount record from physical memory equipment 15 may be record by the accumulation value of not only the above-mentioned but the access occupancy time amount for every I/O, and a universal time amount value and time amount value peculiar to a machine. Moreover, in the disk array control unit 13, the access occupancy time amount of each logic machine, storage region or a physical memory field may be edited, and an occupancy hour entry table may newly be created based on the value which found the access occupancy time amount for every physical memory equipment and every parity group.

[0064] When a host 10 and control terminal 17 grade give the operation information acquisition demand and of physical memory equipment to the disk array subsystem 12 by the above-mentioned, even if a host 10 and control terminal 17 grade access direct physical memory equipment 15 and do not acquire the access occupancy hour entry or a physical memory field, they become possible [acquiring the access occupancy hour entry of the logic storage region and physical memory field from the disk array control unit 13].

[0065] Drawing 9 is drawing showing the example of a configuration of the table which manages matching with the address of a logic storage region and the address of a physical memory field which are stored in configuration classification Research and Data Processing Department 226 in the operation information acquisition section 223 in physical memory equipment 15. From the disk array control device 13, when the relation of a logic storage region and the address of a physical memory field which are produced by the time of starting of the storage subsystem 12, the change in physical memory equipment, change of RAID level, migration of a logic storage region, etc. changes, the data "processing control section 224 in physical-memory memory equipment 15 receives the matching information on the logic storage region and physical memory field, and stores it in a correspondence table as shows it to configuration classification Research and Data Processing Department 226 at drawing 9. This correspondence table is constituted by physical ADORF 7520 by the logic storage region number 700 given to a specific logic storage region, the logical address 710, and the storage number 721 with a physical storage region with that logic storage region and the address 722 of a physical storage region. That is, it can recognize which address logic storage region physical memory equipment 15 has.

[0066] Drawing 10 is drawing showing the example of a configuration of the table of the occupancy hour entry by access to the storage region by I/O accumulated and stored at the occupancy time amount total section 227 of the operation information acquisition section 223 in physical memory equipment 15.

[0067] This table is every logic storage region number 801 and I/O. Occupancy time amount is added every JOB classification 802, I/O As a JOB classification, in the example of illustration, although 870 and a total of 880 are shown at the time of the sequential lead 810, the sequential light parity 820, the sequential light parity 830, the random lead 840 the random light parity 860, and a cache hit, there may be JOB classification.

[0068] If the data "processing control section 224 in physical memory equipment 15 has access in a store by I/O from host etc., it will accumulate the occupancy time amount 880 in the occupancy time amount total section 227 every JOB classification 802 of access about each logic storage region 801 with access. This becomes possible to obtain the relation between the number of the logic storage region in physical memory equipment 15, the occupancy time amount by the access classification to the logic storage region, and the sum total occupancy time amount within a certain time amount within physical memory equipment 15.

[0069] According to the operation gestalt of this invention mentioned above, the occupancy hour entry of the storage for every I/O can be acquired, and acquisition of the occupancy hour entry of the storage by access to a storage region can be realized within physical memory equipment. [0070] According to the operation gestalt of this invention, the thing of two or more physical

memory segments which constitute a storage subsystem for which the occupancy time amount of the logic storage region of physical memory equipment 15 becomes respectively possible by the above-mentioned, and the thing of each logic storage region to do for occupancy time amount [real operating time] acquisition becomes possible by the system configuration unacquirable [with a disk array control unit]. Moreover, in order according to the operation gestalt of this invention mentioned above to be able to make small the error of the analysis of the utilization factor of the logic storage region of said storage subsystem, or utilization factor prediction and to perform optimum performance tune more by taking into consideration the effect on the physical memory equipment for every I/O, the access occupancy hour entry for every I/O to physical memory equipment with a more high precision is acquirable.

[Effect of the invention] As explained above, according to this invention, physical memory equipment can acquire the occupancy time amount of a logic storage region can be acquired by the system configuration unacquirable [with a disk array control unit].

[0071] Moreover, according to this invention, since the access occupancy hour entry for every I/O to physical memory equipment is acquirable, it becomes possible to perform the analysis of the utilization factor of the logic storage region of a storage subsystem and the prediction of a utilization factor in consideration of the effect on the physical memory equipment for every I/O with a small error, and the engine performance of the more nearly optimal storage subsystem can be tuned up.

[Translation done]

* NOTICES *

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This drawing has been translated by computer. So the translation may not reflect the original precisely.
**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Definition of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the computer system equipped with the storage subsystem by this invention.

[Drawing 2] It is the block diagram showing the configuration of physical memory equipment.

[Drawing 3] It is flow chart explaining processing actuation of a disk array control device when a storage subsystem is started.

[Drawing 4] It is a flow chart explaining processing actuation of a disk array control device when correspondence of the address of a logic storage region and the address of a physical memory field changes.

[Drawing 5] It is a flow chart explaining processing actuation of the disk array control device at the time of a disk array control device reading the information on operation information

definition circles of physical memory equipment.

[Drawing 6] It is flow chart explaining processing actuation of the physical memory field control device in physical memory equipment.

[Drawing 7] It is drawing explaining the example of a configuration of the information corresponding to the logic physical memory which manages a correspondence of the address of the logic storage region and physical memory field which are held in the disk array control unit, such as logic operating condition information, stored in a disk array control unit, and physical field operating condition information.

[Drawing 8] It is drawing showing the example of a configuration of the table which manages switching of the address of the logic storage region and physical memory field which are stored in physical memory equipment.

[Drawing 9] It is drawing showing the example of configuration of the table of the occupancy amount total section of the operation information acquisition section in physical memory equipment.

[Description of Notations]

10 Host

12 Storage Subsystem

13 Disk Array Control Unit

14 Disk Array Control Information

15 Physical Memory Equipment

16 Disk Array

17 Control Terminal

18 I/O Bus

19 Network

22 Physical Memory Field Control Unit

23 Physical Memory Field

130 Read/write Processing Section

[Translation done]